

instruments for the application of the measurements of gases to quantitative analysis.

From 1868 to 1870, Dr. Russell was lecturer on chemistry in the Medical School of St. Mary's Hospital. In the latter year he was appointed to a similar office at St. Bartholomew's and retained this appointment until 1897. After his retirement, he continued his experimental work, and until very recently was actively occupied at the Davy-Faraday Laboratory. He died at his house at Ringwood, after a very short illness, on the twelfth of the present month (November, 1909).

At the time of his death, Dr. Russell was one of the oldest Fellows of the Chemical Society, having been elected in 1851. He served on the council from 1863 to 1867, and from 1870 onwards his official connection with the society was unbroken: he was a member of the council from 1870 to 1872; vice-president, 1872 to 1873; secretary, 1873 to 1875; treasurer, 1875 to 1889; president, 1889 to 1891, and since the last date a permanent vice-president. The society, which was only ten years old when Russell joined it, celebrated the jubilee of its foundation in 1891, during his term of office as president. It naturally devolved upon him to take the leading part in the proceedings, and all who were present must have been struck by the admirable manner in which he acquitted himself. He had to make many speeches, long or short, and they were always simple and appropriate. Without wasting words, or any apparent striving after effect, he managed every time to say exactly what wanted saying.

He was elected a Fellow of the Royal Society in 1872; he served twice on the council, and was a vice-president from 1897 to 1899. He was an original member of the Institute of Chemistry, founded in 1877, was president from 1894 to 1897, and served various other offices between 1878 and 1904.

Dr. Russell's connection with Bedford College (London) extended over many years of his life, and was of very great value to the college. It began with his being appointed professor of natural philosophy in 1860. He retained this office until 1870, and opened in 1860 the first laboratory accessible to women-students for practical work at science. He was a member of the council of the college from 1878 to 1903, being chairman from 1887, and also chairman of the college board of education from 1895. During Dr. Russell's chairmanship, the college was twice enlarged, and at the end of his term of office the necessity for still further extension had become so pressing that it was decided to start a fund to provide an entirely new building. He was an active supporter of this movement, and contributed liberally to the fund.

Dr. Russell's contributions to the methods of gas-analysis have been mentioned already. Among other investigations, we may refer to those relating to the atomic weights of nickel and cobalt (1863 and 1869), which were important in consequence of the way in which results obtained by very different methods were employed to check each other; a series of papers in conjunction with Dr. Samuel West, F.R.S., on a new method of estimating urea, which gave rise to a valuable clinical method; papers (conjointly with Mr. Lapraik) on absorption spectra, and notably one on the absorption bands in the visible spectra of colourless liquids, which was the pioneer paper in a branch of inquiry that has been most ably followed up by Prof. Noel Hartley, F.R.S., Mr. E. C. C. Baly, F.R.S., and others; a remarkable series of papers on the action of metals, resins, wood and other materials on a photographic plate in the dark. Some of the results of this investigation were given to the Royal Society as the Bakerian lecture for 1898. By well-

directed and persevering experiments, the effects observed were traced to the generation of peroxide of hydrogen. In another set of experiments on the figures formed by the deposition of dust, Dr. Russell demonstrated the curiously definite course of the convection currents of air that rise from a heated solid body.

A report made to the Science and Art Department, in conjunction with Sir William Abney, on the action of light on water-colours was published as a Blue Book in 1888. It involved a very careful investigation of the subject, and was highly appreciated by artists. A committee consisting of the president and other prominent members of the Royal Academy in reporting on it said that they "unanimously desired to record their sense of the very great value and of the thoroughness and ability with which so laborious an inquiry had been conducted."

In manner, Russell was quiet and entirely free from anything approaching self-advertisement, but he was genial and hearty with his friends, and was gifted with a sympathetic laugh that it was always refreshing to hear. As some indication, both qualitative and quantitative, of the estimate formed of him by his fellows, it may not be out of place to mention that, as a young man, he was the first secretary, treasurer, and keeper of the archives of the B Club—originally a society of young chemists which grew out of Section B of the British Association, first took definite shape at the Oxford meeting in 1860, and kept itself alive between the meetings of the Association by consuming monthly beef-steak puddings at the "Cheshire Cheese"—and that, in later life, he was elected to serve on the committee of the Athenæum Club. His death will be felt as a sore personal loss by very many. He was liked by all who knew him, and by all who knew him intimately he was held in affectionate esteem.

Dr. Russell married, in 1862, Fanny, daughter of the late A. Follett Osler, F.R.S., of Edgbaston. He leaves one son, and a daughter married to Dr. Alexander Scott, F.R.S. G. C. F.

NOTES.

THE *Standard* for November 22 contains a full list of the House of Lords, classified according to their qualifications. It is disappointing to find only two names—those of Baron Rayleigh and Baron Lister—under the heading "Scientists," while "Educationists" are only represented by Baron Ashcombe, member of council of Selwyn College; Baron Killanin, member of Senate of Royal University of Ireland; and the Earl of Stamford, formerly professor of classics and philosophy at Codrington College, Barbados. There are thirty-five railway directors, thirty-five bankers, and thirty-nine so-called "captains of industry" on the list, and a column and a half under "Military and Naval Services."

At the meeting of the Royal Society of Edinburgh on Monday, November 22, the Makdougall-Brisbane prize for the biennial period 1906-8 was presented to Mr. D. T. Gwynne-Vaughan for his papers (1) "On the Fossil Osmundaceae," and (2) "On the Origin of the Adaxially Curved Leaf-trace in the Filicales"; and the Gunning Victoria Jubilee prize for the third quadrennial period 1904-8 was presented to Prof. G. Chrystal, for "A Series of Papers on 'Seiches,' including 'The Hydrodynamical Theory and Experimental Investigations of the Seiche Phenomena of Certain Scottish Lakes.'"

THE Livingstone gold medal of the Royal Scottish Geographical Society has been presented to Sir Ernest Shackleton, in recognition of his work in the Antarctic.

PROF. W. BATESON, F.R.S., professor of biology in the University of Cambridge, has been appointed director of the John Innes Horticultural Institution at Merton, Surrey.

LIEUT.-COLONEL D. PRAIN, F.R.S., director of the Royal Botanic Gardens, Kew, and Prof. F. O. Bower, F.R.S., regius professor of botany in the University of Glasgow, have been elected corresponding members of the Munich Academy of Sciences.

THE council of the Royal Meteorological Society has awarded the Symons gold medal to Dr. W. N. Shaw, F.R.S., in recognition of the valuable work which he has done in connection with meteorological science. The medal will be presented at the annual general meeting of the society on January 20, 1910.

THE King has approved of the Polar medal, with a clasp, inscribed "Antarctic, 1907-1909," being granted to members of the Shackleton Antarctic Expedition, 1907-9, the clasp alone being awarded to those who already possess the Polar medal; the medal and clasp to be in silver for the shore party and in bronze for those who remained with the ship.

DR. T. G. LONGSTAFF writes to the *Times* from Kashmir to correct a statement made in the issue of October 1, and referred to in NATURE of October 7, to the effect that he had found that the source of the Tarim River of Kashgaria is in the Siachen Glacier of Nubra. He says that what he has just been able to prove is that the Siachen Glacier of Nubra is merely the lower portion of the glacier found beyond the Saltoro Pass by Dr. A. Neve, Lieut. Slingsby, and himself in June last, and temporarily designated the Terim Glacier.

A MEETING of subscribers, both ladies and gentlemen, will be held at 5 p.m. on Tuesday, November 30, at the rooms of the Society of Antiquaries, Burlington House, London, to determine in what manner the fund which has been raised as a memorial to the late Prof. Arthur Gamgee should be applied to serve the object for which it was collected. Subscriptions may be sent to Prof. Arthur Schuster, Victoria Park, Manchester; Dr. A. D. Waller, Physiological Laboratory, University of London, S.W.; or Dr. G. A. Buckmaster, University College, London, W.C.

THE annual meeting of the Iron and Steel Institute will be held on Wednesday and Thursday, May 4 and 5, 1910. The proceedings will begin by the induction of the new president, the Duke of Devonshire, into the presidential chair by the retiring president, Sir Hugh Bell, Bart. Under the new bye-laws the council now has the power to elect honorary vice-presidents from among distinguished members of the institute who, by reason of their residence out of Great Britain, are unable to take a very active part in the affairs of the institute. The council has accordingly elected the following to the office of honorary vice-president:—Mr. John Fritz, United States; Mr. William Kestranek, Austria; Baron Fernand d'Huart, France; Mr. F. W. Lürmann, Germany; and Mr. E. J. Ljungberg, Sweden.

THE summary of the weather for the week ending November 20, issued by the Meteorological Office, shows that the conditions for the period were generally dry and fine over the entire kingdom. The temperature was everywhere below the average, the deficiency amounting to 11.6° in the west and east of Scotland, 9.6° in the north of Scotland, and 8.7° in the north-west of England. The minima, which occurred in most places about the middle of the week, were extremely low in Ireland and Scotland, making a record for November in parts. At Balmoral the

sheltered thermometer on November 16 fell to 3°. The radiation temperature on the grass fell to -5° at Crathes, in the east of Scotland, to zero at Balmoral, and to 8° at Markree Castle. At Greenwich frost occurred only on one night in the shade during the period, but in the open, on the grass, there was a frost each night. The rainfall was less than the average in all parts of the kingdom, and in many parts the week was rainless.

ON November 18 and succeeding days the famous volcanic mountain Pico de Teyde, on the north-west of the island of Teneriffe, was in eruption from four craters lying from east to west. The two inside craters are reported to be active alternately, emitting liquid lava only. Owing to the configuration of the ground it is not possible to dam the lava streams or to divert them into channels where they would do less damage. On November 21 the lava stream is said to have travelled 3½ miles since the beginning of the eruption. An official telegram from Teneriffe on November 23 reports:—"The chief crater continues to throw out large quantities of incandescent matter to a height of above 2000 feet. The flow of lava is increasing in volume. The stream running down the Santiago Valley has divided into two, each 12 feet deep and of constantly increasing breadth. The stream flowing in the direction of the Tauranno is advancing more rapidly, and will shortly be swollen by its junction with another stream which has branched off from the main flow. The lowest point of the stream flowing towards Tanque has made no progress since yesterday, and there appears for the moment to be no fear of its resuming its advance, as the crater by which it is fed is becoming less active. On the other hand, the activity of the craters from which the lava flows towards the Santiago Valley is increasing."

THE board of anthropological studies of the University of Cambridge recently re-appointed Mr. A. R. Brown, of Trinity College, to the Anthony Wilkin studentship. This studentship was founded in 1905 in memory of Anthony Wilkin, of King's College, Cambridge, by his parents, for the encouragement of research in ethnology and archaeology. Mr. Brown was elected to the first studentship in the same year, having intimated his desire of studying the social structure and religion of the Andaman Islanders. He returned about eighteen months ago, and since that time has been occupied in writing up his field notes. It is expected that his monograph on the Andaman Islanders will be published next spring. Dr. A. C. Haddon informs us that Mr. Brown's next expedition will be to Western Australia. Extremely little is known about the ethnology of the whole western portion of Australia, and as Westralia is being rapidly developed it is essential that the natives should be thoroughly studied before it is too late. From what little is known, it is evident that the social system of the natives is not uniform, and it is to be hoped that the transition from one form of social organisation to another may be discovered. Mr. Brown proposes to make a general survey of the social and religious conditions of as many tribes as possible, and to make a minute study of one or two of them. If funds permit, he will traverse the continent so as to link up his observations with those of other ethnologists, and at the same time he may be able to clear up some disputed points in the results obtained by previous workers in the field.

THE eighth exhibition of motor-cars arranged by the society of Motor Manufacturers and Traders was held at Olympia during last week. The principal point regarding the many cars exhibited is the almost entire absence of chain drive; in almost every case the live axle is adopted.

In several cases the gear-box is secured rigidly to the engine, thus securing correct alignment should warping of the frame of the car occur. Many of the cars are fitted with front-wheel brakes; the Allen-Liversidge arrangement consists of band brakes on drums secured to the steering wheels on the steering bracket sides, and operated by means of cables passing over pulleys mounted on the steering pivots. The risk of side-slip is much reduced by having the brakes on the front wheels. Most of the cars are petrol driven, steam and electric cars being represented by a few examples only. Among the many accessories shown, the Bowden speed indicator is worthy of notice. In this indicator five steel balls move in radial slots in a rotating disc, and as the speed increases they move outwards and also upwards, being guided by a cup-shaped disc, on which they rest. Another disc, resting on the top of the balls, thus has an upward movement communicated to it, and actuates a pointer through a rack and pinion gearing. The indicator has great sensitiveness and freedom from lag, and, owing to the absence of revolving links, springs, &c., should be applicable to the indicating of much higher speeds of rotation than most instruments at present available are capable of dealing with.

THE subject of the prehistoric antiquities of Scandinavia continues to receive attention in *Naturen*, Prof. A. W. Brøgger contributing an article to the November number in which objects of this nature are figured. Attention is directed to the light thrown on Scandinavian antiquities by those of other countries. Among the figures are copies of two excellent prehistoric representations of reindeer and another of a bear.

THE progress of the plan for marking young birds in this country, initiated by the editors of *Witherby's British Birds*, forms the subject of a note in the November issue of that serial. Out of 4750 rings issued, only 2200 are reported as having been used, this comparatively small proportion being largely due to the late date on which the distribution was made. Taking this fact into consideration, the originators of the scheme consider that the number of birds ringed is satisfactory, and lend to expectation of interesting results, which it is hoped will be exceeded next year, when the rings will be issued sooner.

IN the report of the Museums of the Brooklyn Institute of Arts and Sciences for 1908, Dr. F. A. Lucas is enabled to record a marked improvement in the exhibition series owing to the completion of the east wing of the main building. Great stress is laid on the importance of displaying the exhibits in a picturesque and attractive manner, which can be done, if proper care be exercised, without in any way impairing their scientific interest. It is intended to add pictures of invertebrate life above the cases devoted to the lower organisms, and a beginning has been made in the shape of a sketch of a coral-reef. Other paintings are to be devoted to the beach of a coral-island, the purple jelly-fish, and the Portuguese man-of-war. Attention is directed to a recently mounted group of hoatzias, of which a photograph forms the frontispiece to the report.

IN the September number of the Biological Bulletin of the Woods Hole Laboratory Prof. Raymond Pearl and Miss M. R. Curtis give an account of a partially hermaphrodite Plymouth rock fowl hatched at the Maine Agricultural Station in the spring of 1907, and killed in August, 1908. As regards colour and bodily shape, this bird resembled a normal female of the breed, but the head and neck, especially in respect of the development of the

comb and wattle, recalled a young cock. In general behaviour it resembled a hen rather than a cock, although it occasionally made unsuccessful attempts to crow. Internally a large lobulated gland on the left side occupied the position of the normal ovary, while there was also a complete and functional oviduct; but on the opposite side occurred a small organ representing a testicle, with a normal efferent duct leading to the cloaca. The sexual glands of each type were in a degenerate condition, and apparently incapable of developing their proper sexual elements. The authors of the paper cite another instance of incomplete hermaphroditism in domesticated fowls, as well as one in which the hermaphroditic character was fully developed.

AFTER describing certain new forms of the remarkable fossils typified by those named *Edestus*, Prof. O. P. Hay, in No. 1699 (vol. xxxvii., pp. 43-61) of the Proceedings of the U.S. National Museum, discusses the nature of these spiral serrated structures. It has been generally considered that these structures represent the spines found on the tails of rays like *Trygon*. Dr. Hay is, however, of opinion that they should be associated with the dorsal fin. Their structure may be most easily explained "by supposing that some ancient elasmobranchs developed in front of a median dorsal fin, or in place of it, not a single spine, but a succession of them. The new compressed spine, serrated in front and behind, arose in front of the older ones. Nevertheless, the root of the new spine became directed backward beneath and on each side of the preceding one, so as partly to embrace it. At first probably the older spines were shed, but in time they began to cohere and thus form a compound spine. In *Edestus* this was straight or slightly bent. All, or nearly all, of it, except the serrated teeth, was buried in the flesh. As more and more elements were added, the organ became more curved, and finally in some species formed a spiral, which was directed backward and the last turn of the shaft of which was elevated enough to keep the teeth from cutting into the skin. Such a weapon could be brought into action if only its possessor had dived under its victim and brought the spine across its abdomen, thus disembowelling it. . . . It is in this way that *Gasterosteus* attacks its victims."

THE abnormality known as vivipary, in which young shoots are formed in place of flowers, is described by Mr. G. N. Collins in Contributions from the United States National Herbarium (vol. xii., part x.) for some varieties of the maize plant imported from Mexico and Central America into the States. The shoots arise in the axil of a glume in the position of staminate spikelets, and roots are developed at the base; plantlets placed in the ground made some growth, but failed to mature. The phenomenon is attributed to the excessive vegetative growth shown by tropical varieties of corn when transported to a temperate region. The title-page and index to the volume have now been issued.

AN account of the pear thrips, *Euthrips pyri*, prepared by Mr. D. Moulton, and published by the United States Department of Agriculture as Bulletin No. 68, part i., of the Bureau of Entomology, is the outcome of the writer's investigation of a pest which flourished for two years in the San Francisco region. There is an instructive comparison of the light ravages on the early flowering almond, with the destruction caused on the later blooming prunes, cherries, and pears, that open their flower buds just as the thrips reach their active feeding stage. During the second larval stage the insect enters the ground, where it pupates, and finally emerges as an adult thrip in the spring.

The underground hibernation provides an opportunity for killing the larvæ by ploughing; also the insect has various natural enemies in the shape of spiders, mites, and an unidentified fungus.

An article on *Cornus macrophylla* and other species of the genus is communicated by Mr. B. Hemsley to the *Kew Bulletin* (No. 8). He points out that two evidently different species are passing under the name of *Cornus macrophylla*, the one with opposite leaves, correctly named, the other with alternate leaves, for which he proposes the name *Cornus controversa*. He also describes three new Asiatic species, and discusses the nomenclature of some recent determinations. A short note that deserves mention, partly with the view of eliciting more information, refers to the reported use of plant extracts in Siam as remedies for snake-bite. The evidence depends upon the testimony of natives, who supplied specimens of the plants, which have been identified as *Barleria lupulina* and *Justicia Gendarussa*, both members of the Acanthaceæ. The extract gave characteristic alkaloidal reactions, and contained a quantity of calcium and potassium; these properties are possessed by several plants of this family.

THE Journal, formerly called the Bulletin, of the Tokyo College of Agriculture, recently received, contains several papers on the availability of various phosphatic manures and on the influence on crop-yields of different ratios of lime to magnesia in the soil, a subject to which considerable attention has been paid in Japan. One of the most striking results obtained was that the manurial value of lecithin is about equal to that of sodium phosphate, whilst phytin is nearly equivalent to ferric or aluminium phosphate; nuclein possesses very little manurial value. The experiments were made in soil culture, but similar results are said to be obtained in sand culture also. Of these three compounds, phytin occurs most commonly in plants, and the other two in much smaller quantities. The experiments were devised to throw light on the changes taking place when vegetable matter is dug into the ground, and to explain the beneficial effect on the succeeding crop.

THE Department of Agriculture, Madras, has issued a bulletin describing improvements in paddy cultivation on a farm under the management of the Court of Wards. The best and cheapest fertiliser was found to be farm-yard manure, but a sufficient quantity is not available, and recourse is therefore had to other fertilising materials. Certain plant residues, leaves, poonacs, &c., may be used, but they are too expensive if they have to be brought from any distance. The most successful plan has been to cultivate leguminous crops on the wet land itself during the dry season and in the season in which there are only occasional showers of rain, then to pull up and trample in the crop after ploughing the land.

THE Bulletin of Agricultural Information of the Department of Agriculture, Trinidad, contains numerous notes on cacao. The maintenance of the fertility of the soil is likely to become an important problem before long; at present it is not unusual for a few acres of land to be rented, and when they cease to be remunerative for the tenant to go elsewhere. The land is then abandoned for a few years, covers itself with bush, which is subsequently cleared and burnt, cropped for a short time, and again abandoned. Another source of loss is found in the heavy tropical rain, which washes away finer soil particles as well as some of the plant food. This and other local problems are dealt with at some length.

THE geological age of *Homo heidelbergensis* is discussed by Dr. Emil Werth in *Globus* (xcvi., p. 229); Schoetensack

allocates this find to the earliest Diluvium (NATURE, July 29, p. 132), but Werth, arguing from the associated remains, attributes it to the last but one inter-Glacial age, the Mindel-Riss-Interglacial of Penck. To this period belong the Mauer sand and the high terrace of the Rhine, since both lie below the later loess of the last (Würm) Ice age and the older loess of the last but one (Riss) Ice age. The Gravel of Süssenborn belongs to the same period, as it yields *Rhinoceros etruscus*, *Elephas trogontherii* (like the high terrace of the Rhine and the Norfolk bed), *Elephas meridionalis* (as found in Mindel-Riss-Interglacial stratum on the south side of the Alps), and also a horse allied to *Equus stenonis* of the Mauer sand. At St. Acheul, as at Mauer, there are three terraces, the middle one corresponding to the middle one on the Neckar, as it is covered by both sorts of loess. In the lower sand and gravel of this terrace of St. Acheul is human handiwork of characteristic Chellian form, which, according to Penck, belongs to the Mindel-Riss-Interglacial time. *Homo heidelbergensis* then lived exactly in the middle of the Ice-age period; the end of the Tertiary age was as remotely behind him as the old Palæolithic Chellian culture of his times is behind us. He does not represent the old diluvial Eolithic age, still less is he a type of Tertiary man. Werth considers that this conclusion modifies the arguments which have been based upon the character of the jaw, and he disputes Schoetensack's view that it is of a type prior to that of the anthropoids. He attributes the powerful development of the jaw to have arisen in response to an earlier stronger dentition, and accounts for the deterioration of the teeth by the discovery of fire to soften the food and the employment of stone implements, which did the work for which teeth were previously used.

THE first section of an important paper by Prof. C. F. Marvin, on methods and apparatus for the observation and study of evaporation, appears in the *U.S. Monthly Weather Review* for April. The author points out that while, instrumentally, it is very easy to measure evaporation under certain conditions, it is very difficult to correlate the results obtained by different observers, not that the contributions are necessarily inaccurate, but because they are solutions of a complex problem not yet fully understood. In this section Prof. Marvin deals with the customary methods and their failings, and with the various equations, which he separates into two classes—(1) those developed from mathematical equations representing the phenomena of pure diffusion, and (2) partly rational and partly empirical equations intended to express the relation between evaporation and the meteorological conditions by which it is influenced. Section ii., which will be published subsequently, will deal with apparatus; the author will then describe a special instrument, devised by himself, which records simultaneously on the same sheet the wind, evaporation, and rainfall (if the evaporation pan is not sheltered from precipitation).

In the *Revue générale des Sciences* of October 30, M. L. Teisserenc de Bort gives an interesting account of an investigation of the meteorology of the tropics, based chiefly on observations with kites and registering balloons in the Atlantic between 35° N. and 8° S., and between the coast of Europe and 47° W. longitude. The author goes at some length into the history of the subject and the methods of launching and recovering the balloons, but we can here only briefly refer to the general results obtained. The N.E. trade wind was found to extend, on an average, to about a height of 1000 metres, then a zone was met with in which the winds came generally from N.W. These N.W. winds appeared to cease at about 10° from the

point of convergence of the trade wind, which in summer is about 8° N. At a greater height the zone of winds with a southerly component, forming the anti-trade, was met with; on approaching the equator this zone was found at a lower altitude, being at about 1800 metres near Cape Verde Islands. Temperature first decreased rapidly with height; above 500–600 metres a zone with slight decrease, and extending with or without inversion up to about 2500 metres, was met with, as previously pointed out by Prof. Hergesell. In the neighbourhood of the anti-trade the temperature commenced to decrease regularly up to 14 or 15 kilometres. Above this height the so-called isothermal zone was found, the existence of which was pointed out by the author some years ago. These characteristics are analogous to those observed in temperate regions during a well-formed area of high barometrical pressure.

THE Bausch and Lomb Optical Company, 19 Thavies Inn, Holborn Circus, has published a new microscope chart for use in laboratories where instruction is given in practical microscopy. This appears to be becoming a recognised method of advertising with Continental and American microscope makers, although we are not aware that any English firm has yet issued such a chart. It is extremely well got-up, shows the mechanical and optical essentials of the instrument very well, as well as diagrammatically representing the direction and path of the rays of light which pass from the illuminant and go to form the microscopic image. The chart may be obtained gratis by any college or medical institution, and it can be used with advantage wherever work is done with the microscope.

MESSRS. ERNEST LEITZ, of Wetzlar, Germany, and 9 Oxford Street, W., have issued a new edition of their catalogue of microscopes, and a separate one of microscopical accessories. It is interesting to note that Messrs. Leitz are always more nearly approaching the English type of stand in their new model microscopes; in one at least of their recent instruments the English type has been entirely adopted. They are also bringing out new achromatic condensers, and providing much more efficient arrangements for the centration of these on the microscope. Their new reflecting condenser for dark-ground illumination, which differs from any other in that it consists of spherical reflecting surfaces, is among the best to be obtained. They claim for it that not only is its correction of the highest order, but that the amount of light that actually reaches the object is greater than in any other appliance of a similar nature. In general, the character of the productions of this firm is such that workers who wish to obtain instruments for microscopy may well give attention to these new catalogues.

In the course of his address to the Northern Architectural Association, an abstract of which appears in the *Builder* of November 13, the president, Mr. G. T. Brown, dealt with the question of architectural copyright. The law, as it stands at present, is that the client may demand, not only the whole of the drawings and specifications, but also the studies and detailed calculations, and there is nothing to prevent his making what use of them he pleases. Other buildings may even be carried out by their aid without the architect receiving any compensation for them whatever. Means are taken in other countries to protect the interests of the architectural profession, and the hope is expressed that a Government Bill will be introduced at an early date to deal with the matter.

AN interesting article on New York City bridges, by Mr. T. Kennard Thomson, appears in the *Engineering* NO. 2091, VOL. 82]

Magazine for October. Among other bridges illustrated and described is the Williamsburg Bridge, which is claimed to be the most rigid long-span suspension bridge ever built. The main span is 1596 feet, and the total length of the bridge is 7250 feet, nearly one and a half miles. The stiffening trusses are about 40 feet deep; the four main cables are each made up of thirty-seven strands, each strand containing 208 wires, making a total of 31,784 wires in the four cables. Expansion and contraction and the effect of the live load produce a deflection at the centre of the span of 6 feet 9 inches, and yet this is a very rigid suspension bridge. The Brooklyn suspension bridge has a river span of 1595 feet, the total length being 6000 feet. Its centre rises and falls about 9 feet each way (18 feet in all), partly owing to the loading and partly to fluctuations in temperature. The extreme deflection of the new Blackwell's Island bridge is expected to be about 20 inches. This latter bridge is unique among long-span bridges in respect of the cantilever arms meeting in the centre without any intervening span.

MESSRS. CONSTABLE AND CO., LTD., have just published a cheap edition (2s. 6d. net) of Prof. H. H. Turner's "Modern Astronomy," originally issued in 1901, and reviewed in *NATURE* of March 21 of that year (vol. lxxiii., p. 488). The book gives an admirable account of instruments, methods, and results of astronomy during the last quarter of the nineteenth century, and should now reach a wide circle of readers.

THE fifteenth volume of the new series of the "Reliquary and Illustrated Archæologist" has been published by Messrs. George Allen and Sons at the price of 12s. net. The volume contains the four quarterly parts issued this year, the contents of which have been referred to in these columns as the parts first appeared. It forms a handsome, well-illustrated book, which should appeal to all readers interested in early Pagan and Christian antiquities, mediæval architecture, the survivals of ancient usages, and similar subjects.

MESSRS. WITHERBY AND CO. have published a second edition of Mr. M. J. Nicoll's "Three Voyages of a Naturalist," being an account of many little known islands in three oceans visited by the *Valhalla*, R.Y.S. The original issue of the book was reviewed in *NATURE* for May 14, 1908 (vol. lxxviii., p. 32), when one of its numerous illustrations was reproduced. The only material alteration in the second edition is in chapter xx., where the statement has been corrected that Easter Island, when first discovered, was uninhabited.

A SECOND edition of "A Treatise on Concrete, Plain and Reinforced," by Dr. F. W. Taylor and Mr. S. E. Thompson, with chapters by various other writers, has been published by Messrs. John Wiley and Sons in New York, and by Messrs. Chapman and Hall, Ltd., in this country. The first edition was reviewed in our issue of March 15, 1906 (vol. lxxiii., p. 457). The second edition aims to cover the developments in the design and construction of reinforced concrete since 1905, and to this end more than two hundred pages of new matter have been added. The price of the new edition is five dollars.

MESSRS. BAIRD AND TATLOCK (LONDON), LTD., have sent us a copy of their latest catalogue of general apparatus. The comprehensive character of the catalogue will be gathered from the fact that it runs to 848 large pages. Sections are included in the list dealing with different types of laboratory and other benches, fume cupboards, and other fittings; the special apparatus required for physico-chemical experiments, and instruments necessary for milk,

oil, paper, and water analysis, in addition to general bacteriological and chemical apparatus. The volume will make a very useful addition to the laboratory library of working books; its numerous illustrations, concise descriptions of the more complicated instruments, and orderly arrangement will prove real aids to the selection of laboratory apparatus.

THE librarian of the Library of Congress, Washington, has issued two "Want Lists," each running to more than two hundred pages, one dealing with the publications of societies and the other with periodicals. In a prefatory note to each volume, librarians and secretaries of institutions receiving copies of the lists are asked to check them and to notify the Library of Congress of any duplicates at their disposal which may help to complete the files of the Washington library. We observe that certain copies of NATURE are in request; perhaps some of our readers may have duplicate copies of the following issues, now out of print, which the librarian of Congress would be glad to receive:—1899—May 4, June 15, 22, July 6 to August 10, September 14, and title and index; 1901—August 1, 16 to October 10, 24, 31, and title and index. Librarians are invited to send to the Library of Congress lists of their wants, as there is at Washington a stock of duplicates available for exchange.

OUR ASTRONOMICAL COLUMN.

ATMOSPHERIC REFRACTION.—The Rev. W. Hall, Chaplain Instructor, R.N., has circulated a typescript article on "Refraction in Relation to Astronomical Navigation." It is short and clearly expressed; nothing is assumed as already known, and yet the reader is taken to the furthest limits required for the writer's purpose. The article is therefore a model of what such articles should be.

For purposes of refraction, rays fall under three classes:—(1) a ray from a high star; (2) a ray from a low star; (3) a ray from the horizon finally reaching the observer's eye a few feet above sea-level, but ten miles from his horizon. The second ray is outside the scope of the article, as navigators ought not to observe low stars. The other two rays are considered in detail, and full advantage is taken of the simplifications rendered possible in one case by the altitude of the star and in the other by the thinness of the stratum of the atmosphere traversed. Proper warning is given that the state of the atmosphere at the horizon may not correspond to the barometer and thermometer readings on board ship.

THE SPECTRUM OF HALLEY'S COMET.—Using a slitless spectroscope, attached to the Crossley telescope, Mr. W. H. Wright succeeded in photographing the spectrum of Halley's comet on October 22, about 180 days before the computed perihelion passage.

Two hours' effective exposure was given, the guiding being effected by a movable micrometer attached to the telescope. The plate shows a faint continuous spectrum extending from about λ 3750 to λ 5000, and there is no evidence of the existence of any bright lines or bands characteristic of most cometary spectra; the spectrum is too faint to determine the presence, or absence, of dark lines (Lick Observatory Bulletin, No. 167).

SEASONAL CHANGE ON MARS.—Through the Kiel Central-stelle (Circular No. 115, November 18) Prof. Lowell announces that the first apparent Antarctic snowfall of the season has taken place on Mars. Two patches have appeared in latitude 65° , one in longitude 100° , the other in 190° .

Other changes and new features are announced by MM. Antoniadi, Quénnisset, and J. Comas Sola, respectively, in the November number of the *Bulletin de la Société astronomique de France*. M. Antoniadi reproduces, on four plates, four drawings of the planet made during September and October, and gives several conclusions to which he has been led by his observations at this opposition. Among these we notice that he affirms the superiority of larger instruments in observations of Mars. He also finds that the grey areas are subject to great modifications

of contour, although the Syrtis Major now has the same aspect as in 1864. As regards the objective existence of "canals," M. Antoniadi urges that care should be taken in the nomenclature; some of these features are undoubtedly real and persistent, others have an undulated appearance and are more or less fugitive. He concludes by suggesting that with more powerful equipment the apparent geometrical arrangements would give place to irregularities both of form and tone.

Among other observations, M. Quénnisset directs attention to the unusual dimensions of the Lacus Mœris and to the apparent periodicity of a canal to the south-west of Nectar.

M. Sola describes his observations of the Lacus Solis, and believes he has seen it triple, while he suggests that the two canals, Nectar and Bathys, are really made up by alignments of small "lakes" imperfectly seen, the latter canal being much more easily seen than in many previous oppositions. Fons Juventæ, seen in 1907, has remained absolutely invisible to him during the present opposition.

THE PERSEID METEORS IN 1909.—During July and August watch was kept, at the Lick Observatory, for the August meteors, and on nine nights 755 meteors were seen. A special watch was kept on August 10 and 11, and 220 meteors were seen. July Perseids were exceptionally scarce and faint, and the maximum of the shower occurred on August 11, the hourly rate, during a continuous watch lasting from 11h. 17m to 14h. 41m., being 117. Mr. Oliver states that the radiant appeared to cover a large area, and there was difficulty in separating it from the radiants of the contemporaneous minor showers.

A DAYLIGHT METEOR.—Dr. Palisa records the telescopic appearance of a meteor on September 4 at 10.30 a.m. Whilst making a daylight observation of Castor he was looking through a 1.5-inch finder, having a field of 2° , and saw a bright object cross the field. The velocity was small, and the shape was rather square than circular; the direction was from east to west, and the object was surprisingly large, appearing at least as bright as Venus (*Astronomische Nachrichten*, No. 4367).

SPECTROSCOPIC BINARIES.—In No. 3, vol. xxx., of the *Astrophysical Journal*, Dr. S. A. Mitchell publishes particulars of seven spectroscopic binaries, determined from plates taken at the Yerkes Observatory and measured at the Columbia University. The stars dealt with are β Equulei, β Trianguli, γ Lyrae, θ Virginis, σ 78 Virginis, z_4 σ^2 Canis Majoris, and ζ Canis Majoris.

THE "ANNUAIRE" OF THE BUREAU DES LONGITUDES, 1910.—We have received a copy of this "Annuaire," which is too well known to require detailed description; but it should be remarked that, in accordance with the innovation of 1904, the chemical and physical data are given this year and geographical and statistical data omitted. Similarly, in the astronomical section, the tables of stellar parallaxes, double stars, proper motions, &c., are omitted, and a complete list of the elements of the minor planets is published; about 800 of these objects are now included. The "Annuaire" also contains articles on the reunion of the International Committee for the *Carte du Ciel*, and on tides.

CONFERENCE ON MALARIA IN INDIA.

A FURTHER stage in the campaign against malaria has been reached by the inauguration of a conference on malaria at Simla under Government auspices, a report of the proceedings of which appears in the *Pioneer Mail* of October 15 and 22.

The proceedings were opened with an address by the Viceroy, who, after welcoming the delegates on behalf of the Government, pointed out how grievously India has suffered from the scourge of malaria, which is probably responsible in an ordinary season for one million deaths in the year and for 100 million cases of fever that are not fatal. The prevention of malaria depended upon the extermination of the malaria-carrying mosquitoes, on the prevention of their bites, and on the prophylactic use of quinine. The extermination of the mosquito was largely a question of administration and finance and of the development of sanitation.

An address was then delivered by Colonel Leslie, I.M.S., Sanitary Commissioner with the Government of India. He